# PART II

# BACKGROUND

## ATLAS

| TOPIC | VALUE |
|---|---|
| State Population (July 1, 1996) | 1,183,723 |
| State Surface Area (1990) | 4,110,966 acres |
| Total Miles of Rivers and Streams[a] | not available |
| - Miles of Perennial Rivers/Streams (Subset)[a] | 249 |
| - Miles of Intermittent (Nonperennial) Streams (Subset)[a] | not available |
| - Miles of Ditches and Canals (Subset)[a] | not available |
| - Border Miles of Shared Rivers/Streams (Subset)[a] | 0 |
| Number of Lakes/Reservoirs/Ponds[a] | 12 |
| Number of Significant Publicly Owned Lakes/Reservoirs/Ponds (Subset) | 0 |
| Acres of Lakes/Reservoirs/Ponds[a] | 2168 |
| Acres of Significant Publicly Owned Lakes/Reservoirs/Ponds (Subset) | 0 |
| Square Miles of Estuaries/Harbors/Bays | 40 |
| Miles of Ocean Coast[a] | 1052[b] |
| Miles of Great Lakes Shore[a] | 0 |
| Acres of Freshwater Wetlands | 36,328[c] |
| Acres of Tidal Wetlands | 15,474[c] |

[a] This information should have been provided by the EPA Reach File 3/Digital Line Graph estimates, but was not made available in time for this report.

Note: 1. Impoundments are classified under lakes/reservoirs/ponds in this table. Green Lake, Lake Waiau, Waieleele Pond, Kualapuu Reservoir, Meyer Lake, Hoomaluhia Reservoir, Kaelepulu Pond, Wahiawa Reservoir, Nomilu fishpond, Waita Reservoir, Halalii Lake and Halulu Lake.

2. Data obtained from 305(b) Report (1994), Hawaii Data Book (1996) and Hawaii Wetlands Report (1991).

[b] This figure has been updated. The previous value of 750 statute miles (general coastline) was less accurate than the current value of 1052 statute miles (tidal shoreline). Both figures are from the State Data Book. The 1052 miles reflects the shorelines of all islands in the Hawaiian Chain. The main islands have a total length of 964 statute miles. The actual shoreline miles would probably be slightly higher than this figure.

[c] Data provided by the US Fish and Wildlife Service.

## BACKGROUND

The Hawaiian Archipelago is located in the central Pacific Ocean, approximately 3,000 miles from the continental United States. The State of Hawaii consists of the 8 major and 124 minor islands in the 1,523 mile archipelago. The eight major islands include the islands of Hawaii, Oahu, Maui, Kauai, Molokai, Lanai, Niihau and Kahoolawe.

The State Capital is in the city of Honolulu on the island of Oahu, which is 1,367 miles from Kure Atoll (the westernmost end of the State), 2,397 miles from San Francisco, and 4,828 miles from Washington, D. C. The highest peak in the State is Mauna Kea on the island of Hawaii, 13,796 feet above sea level; the longest stream is Kaukonahua Stream on the island of Oahu, which is 33 miles in length.

Over the span of 25 million years, the islands of the archipelago were formed by volcanic shield-building followed by erosion, sinking and formation of coral reefs. This volcanic activity is still occurring on the island of Hawaii. Consequently, the topography, geology and climate in Hawaii is characterized by remarkable variations, which include unique and diverse micro-environments side-by-side. Within 30 miles on the island of Hawaii, the ecosystem changes from coastal marine coral reefs to the snow-capped summit of Mauna Kea - one of the nation's highest peaks at 13,796 feet. The highest lake in the nation, Lake Waiau, is located at an elevation of 13,020 feet on Mauna Kea. The extremes of altitude and wetness provide a variety of habitats for many unique plant and animal species. The Alakai Swamp on the island of Kauai receives over 400 inches of rain per year. It is known that the State of Hawaii has the highest percentage of endemic plants and animals on earth, and the largest number of endangered species in the country.

On the other hand, the rugged topography of the islands has also restricted most human activity and impacts to coastal and lowland areas. As a result, most of the State's water quality monitoring activities are restricted to the lowland areas. It is assumed, but unproven, that most upland areas of the State such as the Alakai Swamp and many miles of coastline such as the north coast of East Molokai are in pristine condition.

Based on the Department of Health Administrative Rules, Chapter 11-54, Water Quality Standards, adopted October 29, 1992, all waters in Hawaii serve the following two purposes: fish/wildlife habitat and human-related recreational activities, consistent with the fishable and swimmable goals established in the Clean Water Act.

All state waters, except those on the island of Kahoolawe, are classified as fishable and swimmable because their water quality can support wildlife, and aquatic recreational activities.

The inland waters of the 45 square mile island of Kahoolawe are the only unclassified waters in the State of Hawaii. These inland waters are mainly intermittent streams. This island had been used by the United States Navy as a target range. It is presumed that the waters surrounding Kahoolawe are in good condition.

However, in general, habitat destruction, introduction of alien species, intensive fishing, and surface runoff containing high concentrations of sediments, bacteria, nutrients and other chemicals have, over time, caused alterations in the aquatic community structure and a publicly-perceived decrease in the aesthetic qualities of surface waters.

## TOTAL WATERS

Hawaii has been included in the Reach File 3 system. However, the updated files have not been received as of February 1998. Additionally, software to access the data is unavailable to the CWB staff. Any information must be obtained through EPO.

CWB has made progress in developing the necessary expertise in-house and will obtain the applicable software as resources become available. This is one of the areas which CWB had planned to develop further, but was sacraficed in order to complete the stream assessments.

CWB obtained as much of this information as possible for inclusion in this report.

## WATER POLLUTION

The current approach to waterbody assessments has

**CONTROL PROGRAM**

**WATERSHED APPROACH**

resulted in a shift in focus from evaluations of individual waterbodies to a watershed approach. CWB committed to this approach by selecting the Ala Wai Canal watershed as the pilot project. The intent was to develop the methodology in the first phase and subsequently to apply the lessons learned to other watersheds as time and resources allowed.

Planning for the project began in early 1996 and fully implemented by May 1996. The length of the study was one year. The study and its results are included as Appendix A.

**WATER QUALITY STANDARDS (WQS) PROGRAM**

No major changes were made to or are anticipated for the Water Quality Standards. The current revision incorporates the use of *Clostridia Perfringens* as an additional indicator organism.

EPO had made a preliminary proposal to establish biocriteria. However, the plan was not approved and no further actions have been taken in this area.

**POINT SOURCE PROGRAM**

**Overview of point source control program**

The NPDES program is comprised of several parts including pretreatment, general permits and individual permits. Chapter 11-55, Hawaii Administrative Rules {HAR} was amended on October 15, 1992 to include general permits. Thus facilities were now required to aquire permits for storm water discharges associated with industrial activities and/or construction activities, discharges of treated effluent from leaking underground storage tanks, once through cooling water discharges of less than one million gallons per day, hydrotesting water discharges, and discharges associated with construction dewatering activity. Chapter 11-55, HAR was amended again in October 1997 to include discharges of treated effluent from petroleum bulk stations and terminals and discharges of treated effluent from well drilling activities.

**Program actions**

The Enforcement Section's activities include tracking of incoming reports, review of discharge monitoring reports, inspections (scheduled/unscheduled), managing the Permit Compliance System (EPA database), generation of

violation letters and formal enforcement actions. Due to the changes in HAR, Chapter 11-55, the number of violation letters has increased. The rise corresponds to an increase in the number of inspections (and discovery of deficiencies) by other sections in the branch. At the same time, formal actions have decreased because of inadequate staff to process the actions (formal actions are time consuming, the Deputy Attorney General (AG) covers other branches and is not able to spend adequate time with the branch. In addition to working on the formal actions, the AG also reviews revisions in State regulations, rules, etc.) Many actions remain pending, awaiting the resolution of higher priority items.

**Relation to Water Quality**

There is limited review of water quality data. Lack of expertise in this area combined with a shortage of manpower and higher priority items preclude attention to report reviews. Since the reports and data are in hard-copy form, reviews would be time consuming. Identification of trends would require a manual review of months/years of data. Written evaluations placed in the files would be useful for future references. No improvements were made in this area during the review period.

**Effectiveness in improving Water Quality (especially toxics)**

No improvements in this area. As a whole, incoming reports containing monitoring data for toxics are not review/analyzed, and because of this, corrective actions/recommendations are not made. This is due to insufficient manpower to conduct report reviews and a lack of expertise in the area of toxics.

## NON-POINT SOURCE PROGRAM

As previously discussed above and also throughout this report, nonpoint source pollutants have the most detrimental effects of all sources in the State. Storm water flows wash pollutants such as nutrients and silt into streams which then travel to estuaries and coastal areas, polluting these waterbodies as well. Nonpoint source pollution is responsible for the impairment of the majority of the Water Quality Limited Segments. The Department of Health has initiated a Nonpoint Source Pollution Program to begin addressing this problem. This program

is administered by the Polluted Runoff Control (PRC) program under the Clean Water Branch of the Department of Health. The following is from the 1997 Annual Report.

*Section 319(h) Nonpoint Source Implementation Projects*
There were fifteen Section 319(h) education or implementation projects active during this grant period. Four of the these projects were completed during this period:

Reducing NPS in Orchards,
Pelekane Bay Watershed,
Annual Water Quality Training Conference,
NPS Education & Storm Drain Stenciling Assistance.

DOH oversight of these projects required staff time to execute contract extension/modifications, review quarterly status reports and match documentation, and review final project reports and verify completion.

**Reducing NPS in Orchards** was conducted by the University of Hawaii-College of Tropical Agriculture and Human Resources. This project implemented various small grain cover crops and other cover in coffee and lychee orchards. A final report was produced showing the success rates of the various practices. The information gained in this implementation is now available to other agencies like the soil and water conservation districts, Natural Resources Conservation Service, and UH-Cooperative Extension Service to give them further options and assist them in their work with agriculture producers.

**The Pelekane Bay Watershed Phase I Implementation Project** was completed by September, 1997. This was selected with our 1993 group of 319(h) projects. This project implemented a replanting of grass in critically eroded areas, a drinking water distribution system and fencing for paddocks for better range management of livestock. This project had a slow start because of a drought on the Kona side (island of Hawaii) in 1993 made it unrealistic to seed the grass. Another delay was that both the landowner, Queen Emma Foundation, and the land user, Parker Ranch, were reluctant to participate for fear of DOH being an unreasonable partner to the project. The grantee, the Mauna Kea Soil and Water Conservation District, and the DOH worked hard to develop

a Memorandum of Understanding (MOU) of all watershed partners to carry out tasks. Once this was complete the physical implementation took place. This project is a success for several reasons. First and foremost is that it successfully implemented the physical infrastructure (fencing, water piping, seeding) that was needed for successful erosion control in the watershed's management. Second it fostered a spirit of cooperation among all signatory agencies of the MOU and established a trust between DOH and EPA with those that had little trust before, such as the landowner and land user. Third, it implemented the first phase of a multi-phased watershed management plan for Pelekane Bay and has influenced other funding sources such as Natural Resources Conservation Service's (NRCS) Environmental Quality Incentives Program (EQIP) to make Pelekane Bay a priority. Fourth, it helped develop district capacity for the Mauna Kea SWCD.

**The Annual Water Quality Training Workshop** was held in October, 1996. It was sponsored from Section 319(h) funds to the Hawaii Association of Conservation Districts (HACD) to organize. It was well attended with about 125 participants including our project officer and Mr. Mike Schultz of EPA. The conference has been a popular venue to disseminate information on watershed management, nutrient control, sediment control, and pesticide management. HACD sponsored the 1997 annual conference with funding from Section 319(h). PRC staff time was involved in assisting in the conference preparation. DOH Deputy Director Dr. Bruce Anderson gave the Key Note Speech at the Conference. He spoke on "Watershed Management -- the Key to Effective Polluted Runoff Control". The PRC Program Coordinator gave a presentation on summarization of uses of federal Section 319(h) funds since 1990 when project funds were first available. The conference had less attendees this past year, and we will suggest to the conference planning committee to look into reasons why the conference attendance has declined from 205 in 1994 to 110 for the 1997 one.

**NPS Education & Storm Drain Stenciling Assistance.** The last project completed in this grant period was funded from our Section 319(h) core allotment for public education. We passed approximately $10,000 to Youth for Environmental Service (YES) to conduct classroom visits and organize storm

drain stenciling activities, particularly on the neighbor islands, on our behalf. They give a one hour presentation on water pollution--nonpoint source pollution and on introduced plant species. They also recruited elementary through high school aged students to assist in storm drain stenciling activities. Without their assistance, we would have been unable to reach neighbor island audiences.

*Public Education/Outreach*

Although we did have staff turn over in this arena, we were able to participate in several outreach aspects since the program coordinator, the IPA, and other CWB staff assisted in covering activities.

The PRC Program set-up the public education booths and gave presentations at various venues including Health Fairs at Roosevelt High School, Momilani Elementary, Manoa School, Queen Kaahumanu Elementary, Salt Lake Elementary, and Waianae High School. The program was present at special events such as the State Forestry Symposium, the Honolulu Christmas Parade, Hawaii Water Environment Association Annual Meeting, the Hawaii Association Conservation Districts Annual Water Quality Training Conference, Waianae Fisherman's Festival, and the Outdoor Circle's Shower Tree Festival.

The PRC Program manned a booth at one special outreach event, The Palama Settlement Community Day. Palama Settlement is located in a portion of urban Honolulu known for numerous public housing facilities and a high crime rate. It allowed us to reach out to an audience to which we don't always have access. We continued our standard distribution of brochures, posters and coloring books (of which 8,200 were distributed last year).

Storm drain stenciling was still conducted statewide. The PPC finally convinced Blockbuster Video that it would be a positive public relations measure to carry the children's video, "Apoha: a fish story" (developed by the program), as a free checkout to customers. One to two copies of the video are now available at all Blockbuster Video Stores. The PPC also was a main organizer for the annual program, "Awards in the Environment Program." It is sponsored by the Island Business Magazine and acknowledges private sector firms for

their contribution to environmental management.

One PRC sponsored project was featured in EPA's national document, "319(h) Success Stories." The featured project was the Modified Dry Litter Animal Waste Management System. The PPC developed and edited the story for the booklet.

The complete PRC end of year report is attached as Appendix B.

## COORDINATION WITH OTHER AGENCIES

There are several agencies responsible for various areas of environmental concern. Federal facilities (mainly military) are in charge of their own properties. The U.S. Geological Survey generally monitors the streams. CWB monitors the coastal areas. The Counties also monitor coastal areas near their facilities, but do not overlap with those areas monitored by CWB.

Additionally, there are a number of individual projects being worked on at any one given time, and these may also involve some kind of monitoring.

To prevent duplication of effort, monitoring by the various agencies usually does not overlap. While the individual organizations recognize each other's areas of responsibilities, no formal agreements exist to solidify these commitments.

## COST/BENEFIT ASSESSMENT

There is little data available to assess the costs and benefits of the actions necessary to achieve the objectives of the Clean Water Act.

**COSTS:**

Limited data is available concerning the costs of actions necessary to achieve the objectives of the Clean Water Act. The following summarizes these costs.

# TABLE A: COSTS - C&C HONOLULU (WASTEWATER)

| City & County of Honolulu (Wastewater) | O&M | CIP | Total |
|---|---|---|---|
| 1972 | $5,005,601.00 | $11,921,600.00 | $16,927,201.00 |
| 1973 | $5,175,335.00 | $1,707,600.00 | $6,882,935.00 |
| 1974 | $5,793,037.00 | - | $5,793,007.00 |
| 1975 | $5,901,363.00 | $4,136,258.00 | $10,037,621.00 |
| 1976 | $6,172,304.00 | $5,677,112.00 | $11,849,416.00 |
| 1977 | $8,006,494.00 | $23,763,042.00 | $31,769,536.00 |
| 1978 | $10,478,553.00 | $33,402,738.00 | $43,881,291.00 |
| 1979 | $9,644,026.00 | $17,231,038.00 | $26,875,064.00 |
| 1980 | $11,438,917.00 | $11,483,227.00 | $22,922,144.00 |
| 1981 | $14,355,131.00 | $5,784,251.00 | $20,139,382.00 |
| 1982 | $17,460,458.00 | $16,545,383.00 | $34,005,841.00 |
| 1983 | $18,410,822.00 | $22,399,372.00 | $40,810,194.00 |
| 1984 | $23,241,493.00 | $11,103,162.00 | $34,344,655.00 |
| 1985 | $25,161,314.00 | $16,523,966.00 | $41,685,280.00 |
| 1986 | $25,882,302.00 | $62,149,861.00 | $88,032,163.00 |
| 1987 | $26,683,548.00 | $38,843,309.00 | $65,526,857.00 |
| 1988 | $27,441,373.00 | $32,713,336.00 | $60,154,709.00 |
| 1989 | $33,934,516.00 | $1,789,625.00 | $35,724,141.00 |
| 1990 | $35,914,932.00 | $10,127,948.00 | $46,042,880.00 |
| 1991 | $40,223,930.00 | $20,417,805.00 | $60,641,735.00 |
| 1992 | $59,463,334.00 | $8,290,454.00 | $67,753,788.00 |
| 1993 | $54,310,405.00 | $30,661,899.00 | $84,972,304.00 |
| 1994 | $52,107,248.00 | $23,464,109.00 | $75,571,357.00 |

| City & County of Honolulu (Wastewater) | O&M | CIP | Total |
|---|---|---|---|
| 1995 | $52,244,017.00 | $37,139,619.00 | $89,383,636.00 |
| 1996 | $58,785,625.00 | $17,442,402.00 | $76,228,027.00 |
| 1997 | $51,755,703.00 | $34,168,311.00 | $85,924,014.00 |
| Total | $684,991,780.00 | $498,887,427.00 | $1,183,879,208.00 |

## TABLE B: COSTS - C&C HONOLULU (PUBLIC WORKS)

| Year | City & County of Honolulu (Public Works) | | | Total |
|---|---|---|---|---|
| | Engineering | Refuse | Road Maintenance | |
| FY96 | $1,100,000.00 | $100,000.00 | $7,900,000.00 | $9,100,000.00 |
| FY97 | $1,100,000.00 | $100,000.00 | $7,900,000.00 | $9,100,000.00 |
| FY98 | $1,100,000.00 | $100,000.00 | $7,900,000.00 | $9,100,000.00 |
| FY99 est. | $1,100,000.00 | $100,000.00 | $8,000,000.00 | $9,200,000.00 |

## TABLE C: COSTS - COUNTY OF HAWAII (WASTEWATER)

| County of Hawaii (Wastewater) | Wastewater Improvements |
|---|---|
| FY92* | $46,800,000.00 |
| FY93 | $8,200,000.00 |
| FY94 | $6,700,000.00 |
| FY95** | $7,000,000.00 |
| FY96 | $14,400,000.00 |
| FY97 | - |

*Addition of 2 new treatment plants in Hilo and Kona
**Estimate (no data available)

# TABLE D: COSTS - COUNTY OF MAUI

| Year | County of Maui | | | | Total CIP |
|---|---|---|---|---|---|
| | Sewer Operations | Sewer CIP | Flood Control | Drainage | |
| 1974 | $12,527.00 | $132,250.00 | $0.00 | $130,397.00 | |
| 1975 | $150,989.00 | $4,339,695.00 | $0.00 | $62,196.00 | |
| 1976 | $271,119.00 | $2,614,636.00 | $0.00 | $153,454.00 | |
| 1977 | $751,841.00 | $9,792,542.00 | $425.00 | $186,251.00 | |
| 1978 | $503,847.00 | $6,254,820.00 | $3,105.00 | $196,760.00 | |
| 1979 | $959,962.00 | $847,077.00 | $55,674.00 | $558,299.00 | |
| 1980 | $1,593,225.00 | $498,907.00 | $43,456.00 | $981,576.00 | |
| 1981 | $2,862,337.00 | $683,955.00 | $86,732.00 | $26,096.00 | |
| 1982 | - | - | - | - | |
| 1983 | $3,885,536.00 | $648,898.00 | $93,242.00 | $1,359.00 | |
| 1984 | - | - | - | - | |
| 1985 | $4,292,311.00 | $430,574.00 | $469,351.00 | $276,662.00 | |
| 1986 | $4,175,528.00 | $4,957,913.00 | $64,033.00 | $520,326.00 | |
| 1987 | $3,961,744.00 | $378,038.00 | $939,646.00 | $3,167,043.00 | |
| 1988 | $4,211,701.00 | $823,343.00 | $2,397,393.00 | $3,276,876.00 | |
| 1989 | $5,393,316.00 | $2,241,224.00 | $1,089,091.00 | $786,291.00 | |
| 1990 | $7,007,379.00 | $14,494,388.00 | $3,782.00 | $1,338,004.00 | |
| 1991 | $7,497,516.00 | $16,152,853.00 | $1,217,944.00 | $281,460.00 | |
| 1992 | $7,943,150.00 | $10,094,596.00 | $881,977.00 | $1,707,421.00 | |
| 1993 | $11,378,922.00 | $14,520,934.00 | $35,694.00 | $1,208,755.00 | |
| 1994 | $10,718,295.00 | $26,131,799.00 | $7,610.00 | $1,467,251.00 | |
| 1995 | $11,186,067.00 | $21,942,006.00 | $3,014,840.00 | $628,608.00 | |
| 1996 | $11,594,799.00 | $8,381,757.00 | $330,663.00 | $305,270.00 | |
| 1997 | $11,675,896.00 | $12,680,089.00 | $346,768.00 | $68,816.00 | |
| | | | | | $159,042,294.00 |

$56,553,979 CIP for ‘93 - ‘97 (5 yr total)
$88,607,041 CIP for ‘88 - ‘97 (10 yr total)
$159,042,294 CIP for ‘73 - ‘97
Note: data for FY 82 and 84 not available

## County of Kauai

Grove Farm Company, Inc.

Stormwater from the Grove Farm Shopping Center Complex and nearby residential development is channeled to their golf course development. The benefit is reduced sedimentation and turbidity in Puali Stream and the Nawiliwili Bay. This area supports recreational and boating activities.

Capital cost : $11,000,000 built in 1993
Oper. and Maint. cost $1,100,000 per year.

A&B Properties

In 1993, A&B constructed a sediment basin in Kukuiula to detain stormwater generated on their proposed planned community. Although the community has not yet been developed the sediment basin has captured stormwater during rainfall events and has improved the water quality in Kukuiula Bay. This area is used for boating, swimming and fishing.

Princeville Corporation

The planned community at Princeville is serviced by a sewage treatment plant that makes available treated effluent for the irrigation of the 27-hole Princeville Golf Course. The benefit is effluent is reused and not released into Hanalei Bay, a Class AA embayment used heavily for recreation.

Capital cost : not available, built in 1970's
Operation and Maintenance Cost of reusing the effluent: $110,000 per year

**BENEFITS:**

Benefits improve the economic well-being of individuals or firms. This includes, for example, enhanced recreational opportunities and aesthetics and the knowledge that the ecosystem is being protected.

Improvements in commercial fishing (catch rate, etc.):
No documentation available, anecdotal evidence that overfishing may be causing a decline in catch rate.

**SPECIAL STATE CONCERNS AND RECOMMENDATIONS**

Significant Issues That Affect the Water Quality Program:

An improved indicator organism for the assessment of health risks is needed. The use of *Enterococcus* as the indicator organism has proven ineffectual due to the natural presence of the indicator in the environment. The

Hawaii DOH has taken the lead in addressing this concern by the use of *Clostridia Perfringens* as the indicator of choice for sewage contamination. Used in conjunction with *Enterococcus, Clostridia Perfringens* will provide the assessor with a more reliable indicator that sewage is present. While *Enterococcus* will still be used to determine health risks.

Another area of research is the use of Polymerase Chain Reaction (PCR) to directly measure the pathogens of concern in determining health risks. These are the types of activities that EPA should be concerned with, providing the supportive tools necessary for all States to implement their programs.